

Watershed Environmental Services, Inc.

P.O. Box 64947 Burlington, Vermont 05406

Office: 802-860-7385 FAX: 802-860-1964 *51

GASOLINE TANK SITE INVESTIGATION & GROUNDWATER QUALITY REPORT

**VERMONT NATIONAL GUARD
ORGANIZATIONAL MAINTENANCE SHOP #2
PIERPOINT AVENUE
RUTLAND, VERMONT**

Prepared for:

**LTC Alan L. Nye, P.E.
Facilities Management Officer
State of Vermont Adjutant Generals Office**

Prepared by:



**Michael K. Sparks
Principal Hydrogeologist
Watershed Environmental Services, Inc.**

September 5, 1996

VT NATIONAL GUARD OMS#2 RUTLAND GROUNDWATER QUALITY REPORT

1.0 INTRODUCTION

The following is a report on the results of an investigation to determine the degree and extent of petroleum contamination discovered during the closure of an underground gasoline storage tank at the Vermont National Guard's Organizational Maintenance Shop #2 site in Rutland, Vermont. Based on the detection of contaminant concentrations in soil above the Vermont Department of Environmental Conservation (VTDEC) action levels, likelihood of groundwater impact, and proximity of potential sensitive receptors, the Vermont National Guard (State of Vermont Military Department) opted to participate in the VTDEC Site Investigation Expressway Program and proceed directly with a follow-up investigation of the tank site.

A copy of the Site Investigation Expressway Notification form is provided in Appendix 1 (page 1). Also provided in Appendix 1 is a copy of the scope of services/work plan for the follow-up investigation prepared for the Vermont National Guard by Watershed Environmental Services, Inc. The original work plan specified a series of soil borings to facilitate the installation of up to three groundwater monitoring wells, water quality sampling and laboratory analysis for purgeable aromatic hydrocarbons; the scope-of-services was later revised to include the installation and sampling of a forth groundwater monitoring well.

2.0 PREVIOUS WORK

The Vermont National Guard's Organizational Maintenance Shop #2 (VNG OMS#2) facility is located on Pierpoint Avenue in the City of Rutland, Vermont (see Site Map, Appendix 2, page 1). The last Category One underground storage tank on the property, a 1000 gallon gasoline underground storage tank (UST) was removed by MacIntyre Fuels, Inc. of Middlebury, VT on July 22, 1996. MacIntyre Fuels was assisted by Watershed Environmental Services, Inc. who performed the tank removal site assessment and prepared the tank closure report for submission to the Vermont Department of Environmental Conservation (VTDEC) Underground Storage Tank Program.

The site assessment completed in concert with the tank removal found that soils and possibly groundwater at the tank site had been impacted by gasoline released during use of the underground storage tank (UST). Physical inspection and photoionization detector (PID) evaluation of soil conditions at the underground tank site determined that the likely origin of the gasoline contamination was from overfills/spills at the tank fill pipe. Although the surfaces of the tank and piping were corroded, no perforations were found and the tank system passed a tightness test conducted in April, 1996. The turpentine-like odor and relatively low PID signature of the gasoline-contaminated soil (the maximum PID concentration detected was 160 parts per million) are suggestive of an old fuel spill rather than a fresh or on-going gasoline release.

VT NATIONAL GUARD OMS#2 RUTLAND GROUNDWATER QUALITY REPORT

Based on the absence of elevated PID vapor concentrations in a test pit excavated approximately 60 feet down-gradient (east) of the tank site, the area of gasoline contamination did not appear to be laterally extensive. However, discolored soil and PID vapor readings of up to 160 ppm detected at almost 13 feet below ground surface in a second test pit excavated in the footprint of the former UST evidenced a strong likelihood that groundwater had been impacted.

Potential sensitive receptors in the vicinity of the OMS #2 tank site include East Creek (located approximately 300 feet east of the tank site), the Northwestern Elementary School (located approximately 600 feet to the north), the Rutland Regional Correctional Facility (located approximately 175 feet to the south) and a number of single family dwellings located on the west side of Pierpoint Avenue (the closest of which 61 Pierpoint Avenue located approximately 75 feet to the west). Based on the topography and surface drainage patterns, the inferred direction of groundwater flow at the site is to the east. Thus, the primary sensitive receptor with a potential to be impacted if groundwater is contaminated is likely to be East Creek. There are no water supply wells on the property nor within 1/2 mile of the site.

The site investigation work plan proposed by Watershed Environmental Services, Inc. for the VNG OMS #2 site detailed the following activities:

1. Complete a series of soil borings with split-spoon soil sampling and PID (photoionization detector) screening to determine the severity and depth of contamination at the former fuel oil tank site and check for the presence of contamination down-gradient of the tank site. Upon completion of the soil boring activity, install monitoring wells to facilitate groundwater sampling.
2. Take water level measurements in the two test pit monitoring wells installed during the tank closure to determine their suitability as groundwater monitoring points.
3. Sample the groundwater monitoring well array and submit the samples to a certified laboratory for analysis via EPA Method 8020 (volatile aromatic hydrocarbons).
4. Complete a monitoring well point elevation survey and collect groundwater level measurements to facilitate preparation of a water table contour map for the site.
5. Prepare a summary report for submission to the VTDEC Sites Management Section discussing the findings of the site investigation and making recommendations for future action.

The soil boring and monitoring well installation phase of the work plan was initiated on August 5, 1996.

VT NATIONAL GUARD OMS#2 RUTLAND GROUNDWATER QUALITY REPORT

3.0 SOIL BORING AND MONITORING WELL INSTALLATION

The soil boring and monitoring well installation was performed by M&W Soils Engineering, Inc. of Charlestown, New Hampshire. A total of four soil borings, all of which were equipped with monitoring wells, were completed at the site. The monitoring well array installed at the site includes a monitoring well installed at the eastern edge of the former gasoline UST excavation (MW-6), and three down-gradient monitoring wells sited approximately 60 feet to the northeast, east and southeast of the gasoline tank site (designated MW-3, MW-4 and MW-5 respectively). Two test pit monitoring wells installed during the gasoline tank removal on July 22, 1996 are designated MW-1 (located in the tank excavation) and MW-2 (located approximately 60 feet east of the tank site). The locations of the new monitoring wells are depicted on the Water Table Contour Map and Contaminant Distribution Map provided in Appendix 2 (pages 2 and 4).

The soil borings and well installations were completed utilizing a rotary hollow-stem auger drilling machine and a split-spoon sampling tool to recover undisturbed soil samples. Driller's logs are provided in Appendix 3 (pages 3 -6). The drilling tools were decontaminated between borings and the sampling tools were decontaminated after each use. During the soil boring operation WES monitored breathing zone air quality conditions (utilizing an H-Nu Systems PI-101 photoionization detector or PID with a 10.2 eV lamp) and screened the auger spoils and recovered soil samples for the presence of volatile organic compounds (PID vapors). Soil descriptions and the PID vapor screening results are provided in the attached Soil Boring Log (see Appendix 3, pages 1 and 2). Unless noted otherwise, all PID vapor measurements provided in the Soil Boring Logs are sample bag (1 quart-size, self-sealing plastic bags) head-space vapor readings.

The soil borings were completed with the installation of 2 inch diameter, schedule 40 PVC monitoring wells with F480 thread couplings and factory slotted 0.010' screen sections. The open bottom of the monitoring well tubes and the screen sections were wrapped with polyester filter fabric. All monitoring wells were completed to water quality-grade specifications which included silica filter sand packs, bentonite seals, and steel, flush-mounted well protectors. Well construction details are provided in the attached Soil Boring Logs (Appendix 3).

A discussion the rational for the soil boring/monitoring well siting, well construction and evaluation of the soil sampling results follows.

3.1 Soil Boring/Monitoring Well MW-3

Soil boring site MW-3 was located adjacent to the maintenance shop building approximately 60 feet southeast of the former gasoline tank site. This location

VT NATIONAL GUARD OMS#2 RUTLAND GROUNDWATER QUALITY REPORT

was chosen to determine if petroleum contaminants are migrating toward the maintenance shop building and the neighboring Northwestern Elementary School property beyond.

PID screening of auger spoils and split-spoon soil samples recovered from boring MW-3 detected no evidence of petroleum contamination in the upper 5 feet of the soil profile. Soil recovered from 5 feet to 17 feet below ground surface (bgs) yielded PID vapor levels which gradually increased with depth from 1 part per million (ppm) to 1.3 ppm. The soil profile at the site consisted of approximately 7 feet of gravel fill overlying approximately 8 feet of fine sand and silty fine sand containing abundant rocks and cobbles. A rocky glacial till horizon was encountered at 15 feet bgs.; the soil boring was advanced 5 feet into the till horizon. Due to the abundance of large rocks and cobbles, two attempts were needed to reach the target depth. The first boring attempt was abandoned when the augers were unable to breach a large boulder (auger refusal). The second boring attempt was able to reach a depth of 20 feet.

Moist soil conditions were first observed at 10 feet bgs. with saturated conditions detected at 15 feet below ground surface. No soil discoloration, petroleum odors or sheens were discernible in this soil boring. The soil boring was completed with the installation of a water quality-grade monitoring well device constructed with a 10 ft. screen section extending from 10 - 20 feet bgs. (to screen across the water table).

3.2 Soil Boring/Monitoring Well MW-4

Soil boring MW-4 was sited 60 feet due east of the tank site to evaluate conditions in the suspected path of contaminant migration. Due to the abundance of rocks and cobbles in the soil profile, two attempts were necessary to advance the augers into the water table. The first boring was abandoned at auger refusal at 12 feet bgs. and the second boring could not be advanced past 18.55 feet. Auger spoils and split-spoon soil samples recovered during the drilling at this location yielded no evidence of fuel oil contamination (soil discoloration, fuel oil odors and elevated PID readings). Wet soils encountered at 15 feet bgs. yielded no elevated PID vapor readings and no evidence of petroleum sheens. The glacial till horizon was encountered at a depth of 15 feet.

The boring was completed with the installation of a monitoring well equipped with a 10 ft. screen section extending from 8.55 ft to 18.55 ft below ground surface.

3.3 Soil Boring/Monitoring Well MW-5

Soil boring MW-5 was sited approximately 55 feet to the southeast of the tank site to determine if contaminants are migrating in the direction of the neighboring Rutland Regional Correctional Facility property. Of the four boring sites, this location proved to be the most difficult to drill. Almost the entire soil profile contained abundant

VT NATIONAL GUARD OMS#2 RUTLAND GROUNDWATER QUALITY REPORT

large rocks and cobbles which required five attempts to penetrate and then only with the smaller solid-stem auger flights. In two of the abandoned borings sections of the auger flights broke off the drill stem and could not be retrieved.

No PID vapor readings were detected in the dry gravelly soil comprising the upper 10 feet of the soil profile. A PID soil vapor reading 0.2 ppm above background PID levels coincided with the first encounter with moist soil conditions at the top of the glacial till layer. Saturated soil conditions were encountered at a depth of approximately 15 feet; no petroleum sheens were observed in the saturated soil.

The fifth and last soil boring at well site MW-5 reached a total depth of 20.5 feet below ground surface. The boring was completed with the installation of a monitoring well equipped with a 10 ft. screen section extending from 10.5 ft to 20.5 ft. below ground surface.

3.4 Soil Boring/Monitoring Well MW-6

Soil boring MW-6 was sited at the eastern edge of the gasoline tank excavation to determine the severity and vertical extent of the gasoline contamination at the tank site. Gauging of the adjacent 12.5 deep test pit monitoring well (MW-1) found that it did not contain any groundwater, thus a deeper boring was required at this location in order to facilitate the groundwater sampling.

As the boring was within the area disturbed during the removal of the 1000 gallon gasoline UST, the upper 10 feet of the soil profile yielded PID vapor readings of 10 to 15 ppm. The elevated PID vapor readings are attributed to the backfilling of contaminated soil excavated during the tank removal activity (PID screening of soil during the tank removal did not detect any contamination in the top 3 feet of the soil profile). Auger spoils and split-spoon soil samples recovered from 10 feet to 15 feet below ground surface yielded PID vapor readings of only 2.5 to 3 ppm. However, soil recovered from below 15 feet yielded PID vapor readings which increased with depth from 3 ppm at 15 feet to 90 ppm at 21 feet bgs. The increase in PID readings coincided with the encounter with the wet soils in the glacial till horizon. The glacial till evidenced discoloration and yielded moderately strong stale gasoline odors, although no petroleum sheen was observed in the wet soil.

The boring was completed with the installation of a monitoring well constructed with a 10 ft. screen section extending from 10.1 ft to 20.1 feet below ground surface.

4.0 GROUNDWATER QUALITY SAMPLING RESULTS

The monitoring well array was developed and sampled by Watershed Environmental Services (WES) on August 17, 1996. Prior to developing the wells for sampling, the well bores were subjected to PID vapor screening (head-space screening) and water level measurements were taken. The water level measurements along with the well

VT NATIONAL GUARD OMS#2 RUTLAND GROUNDWATER QUALITY REPORT

point elevation data are tabulated in Table 1 provided in Appendix 2 (page 3). The monitoring well bore head-space PID readings are provided in Table 2 (see Appendix 3, page 1). Table 2 also summarizes the results of the laboratory assays of the groundwater samples. The individual laboratory report forms for the groundwater sample analyses are provided in Appendix 4.

4.1 Sampling Methodology and Procedures

Prior to sampling, the groundwater monitoring wells were developed with a disposable polyethylene plastic bailer. A minimum of three well-volumes of groundwater were removed during the well development procedure to insure sampling of fresh groundwater. After development, the disposable bailers were used to collect the record groundwater samples. A new bailer was utilized at each sampling location.

The water quality samples were collected in 40 ml VOA containers equipped with Teflon septa and stored in a cooler on ice until delivery to the laboratory. All samples were analyzed in the laboratory for purgeable aromatic hydrocarbons (BTEX and MTBE) via EPA Method 8020. A trip blank sample, consisting of a distilled water sample placed in a 40 ml VOA vial, was prepared by the laboratory when the sample containers were picked up by the sampler just prior to the groundwater sampling date and accompanied the samples until delivery to the laboratory. The trip blank sample was analyzed along with the groundwater samples by the laboratory as part of the sample handling QA/QC procedure. No contamination was detected in the trip blank sample (see Appendix 4, pages 2 and 6).

4.2 Field Measurements and Observations

The results of the water level gauging are tabulated on the attached Table 1 (see Appendix 2, page 3). Depths to the water table at the site as measured on August 17, 1996 ranged from approximately 16 feet at well MW-6 (at the tank site) to approximately 19 feet at well MW-5 (55 feet southeast of the tank site).

Contouring of the water table elevations calculated for the groundwater monitoring wells indicates that groundwater flow is predominantly to the southeast at a gradient of approximately 6% to 7%. The water table contouring indicates that monitoring well MW-5 is in a good position to intercept any dissolved phase contaminants migrating from the tank site.

Inspection of groundwater removed during the well development operation found no evidence of free phase product or petroleum sheens in ground water at any of the four monitoring well sites. Wells MW-3 and MW-6 both contained almost three feet of water and recharged quickly. Wells MW-4 and MW-5 were found to contain only a couple of inches of water which was heavily laden with sediment. Well MW-4 did

VT NATIONAL GUARD OMS#2 RUTLAND GROUNDWATER QUALITY REPORT

not contain enough groundwater to sample and the sample collected from well MW-5 was predominantly saturated sediment.

The pre-sampling PID head-space screening of the monitoring wells detected a PID vapor levels of 0.6 ppm (above background) in well MW-3 and 2.1 ppm (above background) in well MW-5. No elevated PID vapor concentrations were detected in well MW-4. Well MW-6 at the tank site yielded a PID vapor reading of only 5 ppm (over background) while the adjacent vadose zone monitoring well MW-1 yielded a PID reading of 19 ppm. The Monitoring well PID screening results are summarized in Table 2 (Appendix 4) and depicted on the attached Contaminant Distribution Map (see Appendix 2, page 4).

4.3 Groundwater Sampling Results

The results of the EPA Method 8020 laboratory assays of groundwater collected from the monitoring well array are tabulated below. The sampling results for MW-6 confirm that groundwater at the former gasoline tank site has been impacted by petroleum contaminants. The contaminants Benzene and Xylene are present in groundwater at concentrations above the VTDEC's *Chapter 12 Ground Water Protection Rule and Strategy* Enforcement Limit. While Toluene and Ethylbenzene were also detected in the groundwater assay, they do not exceed the VTDEC Enforcement Limits for these contaminants in groundwater.

EPA Method 8020	Enforcement Limit (ppb)	STATION / CONCENTRATION				
PARAMETER		MW-3	MW-4	MW-5	MW-6	Trip Blank
Benzene (ug/L)	5	4.4	NS	<20	300	<1
Ethylbenzene (ug/L)	680	<1	NS	<20	561	<1
Toluene (ug/L)	2420	2.8	NS	<20	164	<1
Xylene (ug/L)	400	<1	NS	<20	780	<1
MTBE (ug/L)	40	<10	NS	<200	<500	<10
Total BTEX (ug/L)		7.2	NS	<20	1805	<1
Head-space PID (ppm)	20	1	0.4	2.5	5	

Note: PID background readings = 0.4 ppm

The EPA Method 8020 assay of the sample collected from monitoring well MW-5 yielded no quantifiable concentrations of Benzene, Toluene, Ethylbenzene or Xylene (BTEX) in groundwater down-gradient of the tank site. However, the presence of PID-detectable vapors in the well bore (2.1 ppm over background) indicates that this portion of the site is not completely free of contaminants. Monitoring well MW-5 is quite close (and down-gradient) to the location of a former diesel fuel oil UST which was removed several years ago. Thus, the slightly elevated PID vapor readings may be attributed to the presence of petroleum residue in the soil proximal to the former diesel fuel UST rather than evidence of contaminants migrating from the gasoline tank site. The absence of any unidentified peaks (non-target compounds) in the EPA

VT NATIONAL GUARD OMS#2 RUTLAND GROUNDWATER QUALITY REPORT

Method 8020 assay is seen as further evidence of the lack of significant petroleum contamination in groundwater at this location.

Interestingly, the EPA Method 8020 assay of groundwater sampled at monitoring well MW-3 (located approximately 60 feet northeast of the tank site) revealed the presence of Benzene and Toluene in concentrations of 4.4 ppb and 2.8 ppb respectively. As the contouring of the water table indicates that groundwater flow at the site is to the southeast at a gradient of 6% to 7%, the low level of contamination detected in groundwater at well MW-3 may be attributed to activities in the maintenance shop or contaminants from another up-gradient source rather than an indication of contaminant migration from the former gasoline tank site.

5.0 SENSITIVE RECEPTOR SURVEY

The survey of potential sensitive receptors performed during the tank removal on July 22, 1996 and again during the soil boring and groundwater sampling of August 5 and 17, 1996 found that the only sensitive receptors impacted by the gasoline release at the Organizational Maintenance Shop #2 site are soil and groundwater in the immediate vicinity of the former gasoline tank. The relative absence of significant levels of soil vapor and dissolved-phase contaminants in the soil borings/monitoring wells installed down-gradient of the gasoline UST site indicate that neither East Creek or the neighboring properties are likely to be impacted by the presence of gasoline contamination on the Vermont National Guard property.

The closest known water supply well to the site is 6500 feet to the west (on Pine Hill) of the OMS #2 site. Given that the maximum level of contamination in groundwater at the OMS #2 site is 300 ppb Benzene and 1805 ppb total BTEX and that the site is underlain by a dense glacial till layer, the potential for petroleum contaminants at the OMS #2 gasoline tank site to impact this water supply well is considered to be low. Additionally, the area is served by a municipal water supply system.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Although the laboratory testing has determined that petroleum contaminants are present in groundwater at the former gasoline UST site, the degree and extent of contamination at the tank site is such that it is unlikely that any nearby receptors will be significantly impacted. This assessment is based on the absence of any detectable free-phase product and low PID vapor concentrations (maximum detected concentration 160 ppm) in the subsurface environment at the tank site, and the absence of significant contamination at the three soil boring/groundwater monitoring well sites located approximately 60 feet down-gradient of the tank site. Furthermore, the relatively low PID vapor readings and turpentine-like odor of the soil vapor present in soil at the tank site indicate that the gasoline contaminants are in an advanced stage of degradation.

VT NATIONAL GUARD OMS#2 RUTLAND GROUNDWATER QUALITY REPORT

Despite the apparently low potential for the contamination present at the OMS #2 site to impact neighboring properties and sensitive receptors, the level of contamination in soil and groundwater at the former underground gasoline storage tank site is above allowable limits as set forth in the VTDEC's *Chapter 12 Ground Water Protection Rule and Strategy* and the *Agency Guidelines for Petroleum Contaminated Soil and Debris*.

The EPA Method 8020 assay of groundwater sampled at the former gasoline tank site determined that Benzene and Xylene compounds are present in groundwater in concentrations above the VTDEC Chapter 12 Ground Water Protection Rule and Strategy Enforcement Limit for these contaminants. The Enforcement Limit for Benzene in groundwater is 5 parts per billion (ppb); the concentration of Benzene detected in groundwater at the former gasoline UST site is 300 ppb. The Enforcement Limit for Xylene is currently 400 ppb, however if the proposed changes to the Chapter 12 groundwater rules are adopted, the Enforcement Limit for Xylene may be increased to 10,000 ppb. As the groundwater rule now stands, the 780 ppb concentration of Xylene detected in groundwater at the tank site is in exceedance of the Enforcement Limit. Additionally, the PID soil vapor concentration of 160 parts per million (ppm) detected in soil at the tank site exceeds the VTDEC soil guideline level of 20 ppm for gasoline contaminants.

While soil and groundwater quality conditions at the OMS #2 site do not currently meet the eligibility requirements for site closure as defined under the VTDEC Site Management Activity Completed Compliance Procedure, the information gained from this follow-up investigation has satisfied a number of the criteria for Site Management Activity Completed (SMAC) eligibility. Specifically, the work completed at the OMS #2 site to date has defined the source, nature and extent of the contamination, confirmed that the source of the contamination (the underground gasoline storage tank system) has been removed, and determined that the contamination remaining on the site does not pose an unacceptable threat to human health and the environment. What cannot be determined at this time is whether contaminant levels in soil and groundwater at the site are stable or falling.

To establish the site's eligibility for closure, we propose the following monitoring plan:

1. Utilize existing groundwater monitoring wells MW-3, MW-4 and MW-5 as the compliance boundary for groundwater enforcement standards. Contouring of the water table at the site indicate that these wells, which are all on the OMS #2 property and within 75 feet of the property boundaries, will satisfactorily monitor groundwater quality conditions down-gradient of the contaminant source area.

VT NATIONAL GUARD OMS#2 RUTLAND GROUNDWATER QUALITY REPORT

2. Conduct bi-annual monitoring and sampling of the four groundwater monitoring wells (MW-3, MW-4, MW-5 and MW-6) and vadose monitoring well MW-1 (located in the gasoline tank excavation) a one year period to confirm that contaminant levels at the tank site are declining over time. The sampling would be scheduled to coincide with seasonally high and seasonally low water table conditions. The monitoring procedure shall entail PID screening of the monitoring wells, gauging for free product and the collection of water level measurements for the purposes of determining the direction of groundwater flow. The sampling program shall entail the collection of groundwater samples for laboratory analysis via EPA Method 8020.
3. At the end of year one, if contaminant levels prove to be stable, falling or non-detectable, we shall prepare for the VTDEC's consideration a petition for a Site Management Activity Completed designation.



State of Vermont

Department of Fish and Wildlife

Department of Forests, Parks and Recreation

Department of Environmental Conservation

State Geologist

RELAY SERVICE FOR THE HEARING IMPAIRED

1-800-253-0191 TDD>Voice

1-800-253-0195 Voice>TDD

AGENCY OF NATURAL RESOURCES
Department of Environmental Conservation

Waste Management Division

103 South Main Street/West Office

Waterbury, Vermont 05671-0404

(802) 241-3888

FAX (802) 241-3296

SITE INVESTIGATION EXPRESSWAY NOTIFICATION

Site Owner: State of Vermont Military Department

Site Name, Town: Organizational Maintenance Shop #2 Rutland

☒ Yes, this site will participate in the Site Investigation Expressway Process.

☐ No, this site will not participate in the Site Investigation Expressway Process.

If yes, please complete the checklist below:

✓ Contamination present in soils above action levels ☒ Yes ☐ No

If yes, summarize levels:

PMD readings in soil at gasoline tank excavation 160ppm

✓ Free product observed ☐ Yes ☒ No

✓ Groundwater contamination observed ☐ Yes ☒ No

✓ Surface water contamination observed ☐ Yes ☒ No

✓ Suspected release of hazardous substances ☐ Yes ☐ No

If yes, please explain:

✓ Affected receptors ☐ Yes ☒ No

If yes, please identify receptors including names and addresses of third party receptors:

Please provide an estimated date of when you expect to submit Site Investigation Report: 9-1-96

Watershed Environmental Services, Inc.

P.O. Box 64947 Burlington, Vermont 05406

Office: 802-860-7385 FAX: 802-860-1964 *51

July 25, 1996

Major Raymond P. Bouchard
Environmental Protection Manager
State of Vermont Adjutant General's Office
Building #5, Camp Johnson
Colchester, VT 05446-3004

FILE

Re: Vermont National Guard
Organizational Maintenance Shop #2, Rutland, VT
Proposal for Groundwater Monitoring Well Installations

Dear Major Bouchard:

I am pleased to provide for your consideration the enclosed proposal/cost estimate for the installation of groundwater monitoring wells at the Organizational Maintenance Shop #2 in Rutland. I have solicited quotations for drilling and well installation services from two reputable contractors - Tri-State Drilling & Boring, Inc. of West Burke, VT and M&W Soils Engineering, Inc. of Charlestown, NH. As the two drilling firms had comparable pricing, that costing provided in the attached proposal will work for either contractor.

As we discussed, I have prepared an estimate of costs for the installation of two groundwater monitoring wells to determine the degree and extent of petroleum contamination proximal to the former 1000 gallon underground gasoline storage tank site. In the event that the monitoring well we installed in the excavation at the time the tank was removed is not deep enough to permit groundwater sampling or location of the water table, I have provided costing for installation of a third well. A minimum of three well points are needed to accurately map the direction of groundwater flow at the site (and thereby establish the direction of contaminant migration). The proposal I have prepared provides costing for groundwater sampling, laboratory analysis and a written report in addition to the monitoring well installation. If this level of investigation is not satisfactory, I would be pleased to amend the scope of services to meet your needs.

Feel free to call if you have any questions or if I can be of further assistance. Thank you for the opportunity to quote this work for you.

Sincerely,

Michael K. Sparks
Principal Hydrogeologist

enclosure

mks/7-25-96/vng-rutl.ce1

Watershed Environmental Services, Inc.

P.O. Box 64947 Burlington, Vermont 05406

Office: 802-860-7385 FAX: 802-860-1964 *51

SCOPE OF SERVICES

Underground Storage Tank Site Investigation Vermont National Guard Organizational Maintenance Shop #2 Pier Point Avenue, Rutland, Vermont

Page 1-2

Prepared for:

Major Ray Bouchard
Environmental Protection Manager
Camp Johnson, Colchester, VT

Location:

VTANG Organizational Maintenance Shop #2
Pier Point Avenue, Rutland, VT

ACTIVITY 1: SOIL BORING AND MONITORING WELL INSTALLATION SUPERVISION

Watershed Environmental Services to coordinate project with VT National Guard and subcontractors, prepare Site Safety Plan and supervise soil boring and monitoring well installation, screen soils for presence of contaminants with photoionization detector, and prepare soil boring log.

- Hydrogeologist: \$50/hr. x 10 hrs
- Mileage expenses: \$0.30/mile x 150 miles
- PID rental: \$60/day x 1 day

\$500.00
\$45.00
\$60.00
\$605.00

ACTIVITY 2: SOIL BORING AND MONITORING WELL INSTALLATION

Environmental Drilling Contractor with rotary hollow-stem auger drilling machine to complete two 25-ft. deep soil borings with soil sample recovery and complete installation of two 2 inch diameter PVC water quality-grade groundwater monitoring wells. Well installation includes steel, flush-mounted protective casings set in concrete.

- Mobilization: \$385
- Drilling machine: \$120/hr. x 6 hrs
- Well materials: \$200/well x 2 wells
- Well protectors installation: \$148 x 2
- Steam cleaning: \$55

\$385.00
\$720.00
\$400.00
\$296.00
\$55.00
\$1856.00

OPTION 1: ADDITIONAL WELL INSTALLATION

Installation of additional groundwater monitoring well.

- Hydrogeologist: \$50/hr. x 3 hrs.
- Drilling machine: \$120/hr. x 2 hrs
- Well materials: 200/well
- Well protector with concrete: \$148

\$150.00
\$240.00
\$200.00
\$148.00
\$738.00

ACTIVITY 3: GROUNDWATER SAMPLING AND WELL POINT ELEVATION SURVEYING

Watershed Environmental Services to complete groundwater sampling and perform well point survey for construction of water table contour map. Sampling via disposable bailers. *Endyne, Inc.* to perform laboratory analysis of groundwater samples for BTEX, MTBE and TPH compounds and GC/FID petroleum fingerprinting (2 groundwater samples plus trip blank sample).

- Hydrogeologist: \$50/hr. x 8 hrs
- Sampling equipment: \$10/well x 3 wells
- Transit rental: \$50
- Laboratory fees:
EPA Method 8020 (BTEX & MTBE): \$60/sample x 3 samples

\$400.00
\$30.00
\$50.00
\$180.00
\$660.00

SCOPE OF SERVICES
Underground Storage Tank Site Investigation
Vermont National Guard Organizational Maintenance Shop #2
Pier Point Avenue, Rutland, Vermont

Page 2-2

ACTIVITY 4: REPORT

Watershed Environmental Services to prepare a summary report on the findings of the tank site investigation. Report to include a site map, area map, groundwater contour map, soil boring logs, copies of all analytical data, conclusions and recommendations.

- Hydrogeologist: \$50/hr. x 12 hrs
- Draftsman: \$30/hr x 3 hrs
- Binding and mailing: \$12

\$600.00
\$90.00
\$12.00
\$702.00

Total Cost (without Optional Activity): \$3823.00

Terms and Conditions

- Terms: Net 30 days from date of invoice;
- This cost estimate is not a not-to-exceed bid, however costs shall not exceed 15% of the estimated price without prior authorization from the client.
- Optional activities or work outside the scope of services performed at the client's request shall be billed on a time and materials basis.
- Material and subcontractor expenses billed at cost plus 10%.
- Watershed Environmental Services, Inc. and its subcontractors shall have no responsibility whatsoever for, and the Owner shall indemnify, defend and hold Watershed Environmental Services, Inc. harmless from, any liability, claim, or cost (including reasonable attorney's fees), arising from the existence and/or discovery of any hazardous waste or substance and/or other contamination on-site. In the event any such hazardous waste and/or contamination is discovered in the course of the project, the Owner shall immediately take all steps required by state and/or federal law to notify the appropriate authorities and otherwise comply with all applicable state and federal laws. Watershed Environmental Services, Inc.'s liability to the Owner for any claim of any kind whatsoever arising in connection with the project shall be strictly limited to the amount paid by the Owner to Watershed Environmental Services, Inc. for its work on the project.
- Watershed Environmental Services, Inc. and its subcontractors shall not be responsible for any losses or expenses incurred as a result of, or repair/replacement costs for damage to underground structures or utilities not properly located by the Owner.
- Costs for contaminated material clean up and disposal are not included in the base bid price.
- Base bid price does not include replacement of disturbed pavement or concrete sidewalk.
- Date effective: July 25, 1996. This quote is valid for 60 days from date effective.

Given by:

Accepted by:

Michael K. Sparks, Watershed Environmental Services

Date:



STATE OF VERMONT
OFFICE OF THE ADJUTANT GENERAL
CAMP JOHNSON
COLCHESTER
05446-3004
(802) 654-0300

29 July 1996

Mr. Michael K. Sparks
Watershed Environmental Services, Inc.
P.O. Box 64947
Burlington, VT 05406

Dear Mr. Sparks:

RE: Groundwater Monitoring Well Installations @ Organizational Maintenance Shop #2 in Rutland, VT

This letter shall serve as your official "Notice to Proceed". The terms of the agreement are per the scopes of services and letter dated 25 July 1996 that were submitted by you. The agreed upon total cost is \$3,823.00, and includes estimates for a third well.

The following are clarifications and additional stipulations to the agreement:

1. Any changes of the original quote must be approved in writing prior to proceeding.
2. All invoicing for this project must be received at this office no-later-than 16 September 1996.
3. The planned placement of the three wells must be marked on the attached sketch by you and submitted to this office for review and approval prior to commencement of work.
4. The third well is an additional well which may or may not be needed, based on the effectiveness of the field expedient well already placed in the excavation pit. If possible, the field expedient well shall be used instead and a third well not drilled.

Major Raymond Bouchard shall continue as the project coordinator. Please direct coordination and questions to him at (802) 654-0306. As in the past, we look forward to working with you.

Sincerely,

A handwritten signature in black ink, appearing to read "Alan L. Nye".

For,

ALAN L. NYE, P.E.
Lieutenant Colonel, VT Army Nat'l Guard
Facilities Management Officer

Attachments



STATE OF VERMONT
OFFICE OF THE ADJUTANT GENERAL
CAMP JOHNSON
COLCHESTER
05446-3004

(802) 654-0306

19 August 1996

Mr. Michael K. Sparks
WATERSHED ENVIRONMENTAL SERVICES, INC.
P.O. Box 64947
Burlington, VT 05406

Dear Mr. Sparks:

RE: Change Order for Organizational Maintenance Shop #2 in Rutland, VT

Enclosed is the second Change Order for the Organizational Maintenance Shop project in Rutland, VT.
The enclosed Change Order has original signatures.

If any questions exist or further information is needed, do not hesitate to call at (802)654-0306.

Sincerely,

A handwritten signature in black ink, appearing to read "Raymond P. Bouchard".

RAYMOND P. BOUCHARD
Major, VT Nat'l Guard
Environmental Protection Manager

Enclosures

CHANGE ORDER NOTICE

CHANGE ORDER NO. 1

CONTRACTOR: Watershed Environmental Services, Inc.
c/o Mr. Michael Sparks
P.O. Box 64947
Burlington, VT 05406

CONTRACT NO. _____
VENDOR NO. _____
AID NO. _____
ENC. NO. _____

PROJECT NAME: Monitoring Well Installation & Investigation @ OMS #2, Rutland

NATURE OF CHANGE:

For materials to install a fourth well only. Reports and bills to be delivered to the Owner on or before 16 September 1996.

ENCLOSURES: None

The changes result in the following adjustment of Contract Price and Contract Time:

Contract Price Prior to this Change Order	\$ 3,823.00
Net Increase/Decrease Resulting from this Change Order	\$ 350.00
Current Contract Price Including this Change Order	\$ 4,173.00
Contract Time Prior to this Change Order	N/A Calendar Days
Net Increase/Decrease Resulting from this Change Order	N/A Calendar Days
Current Contract Time Including this Change Order	N/A Calendar Days

The Above Changes are Requested:

RAYMOND P. BOUCHARD, MAJ

By: 

Date: 6 Aug 96

The Above Changes are Accepted:

WATERSHED ENVIRONMENTAL SERVICES, INC.

By: 

Date: Aug 6, 1996

TO: WATERSHED ENVIRONMENTAL SERVICES, INC.
CONTRACTOR

You are hereby directed to make the changes noted above in the subject contract.

DATE: 6 Aug 96

By: 

Title: VT-IMO

CHANGE ORDER NOTICE

CHANGE ORDER NO. 2

CONTRACTOR: Watershed Environmental Services, Inc.
c/o Mr. Michael Sparks
P.O. Box 64947
Burlington, VT 05406

CONTRACT NO. _____
VENDOR NO. _____
AID NO. _____
ENC. NO. _____

PROJECT NAME: Monitoring Well Installation & Investigation @ OMS #2, Rutland

NATURE OF CHANGE:

Additional inspection services required at Monitoring Well

TOTAL COST: \$738.00

ENCLOSURES: None

The changes result in the following adjustment of Contract Price and Contract Time:

Contract Price Prior to this Change Order	\$ 4,173.00
Net Increase/Decrease Resulting from this Change Order	\$ 738.00
Current Contract Price Including this Change Order	\$ 4,911.00
Contract Time Prior to this Change Order	N/A Calendar Days
Net Increase/Decrease Resulting from this Change Order	N/A Calendar Days
Current Contract Time Including this Change Order	N/A Calendar Days

The Above Changes are Requested:

RAYMOND P. BOUCHARD, MAJ

By: 

Date: 11-Aug-96

The Above Changes are Accepted:

Watershed Environmental Services, Inc.

By: 

Date: 8-12-96

TO: Watershed Environmental Services, Inc.
CONTRACTOR

You are hereby directed to make the changes noted above in the subject contract.

DATE: 13-Aug-96

By: 

Title: FNE MGT OPT

U.S.G.S TOPOGRAPHIC MAP SECTION - SITE MAP

VT NATIONAL GUARD ORGANIZATIONAL MAINTENANCE SHOP #2

PIER POINT AVENUE, RUTLAND, VT

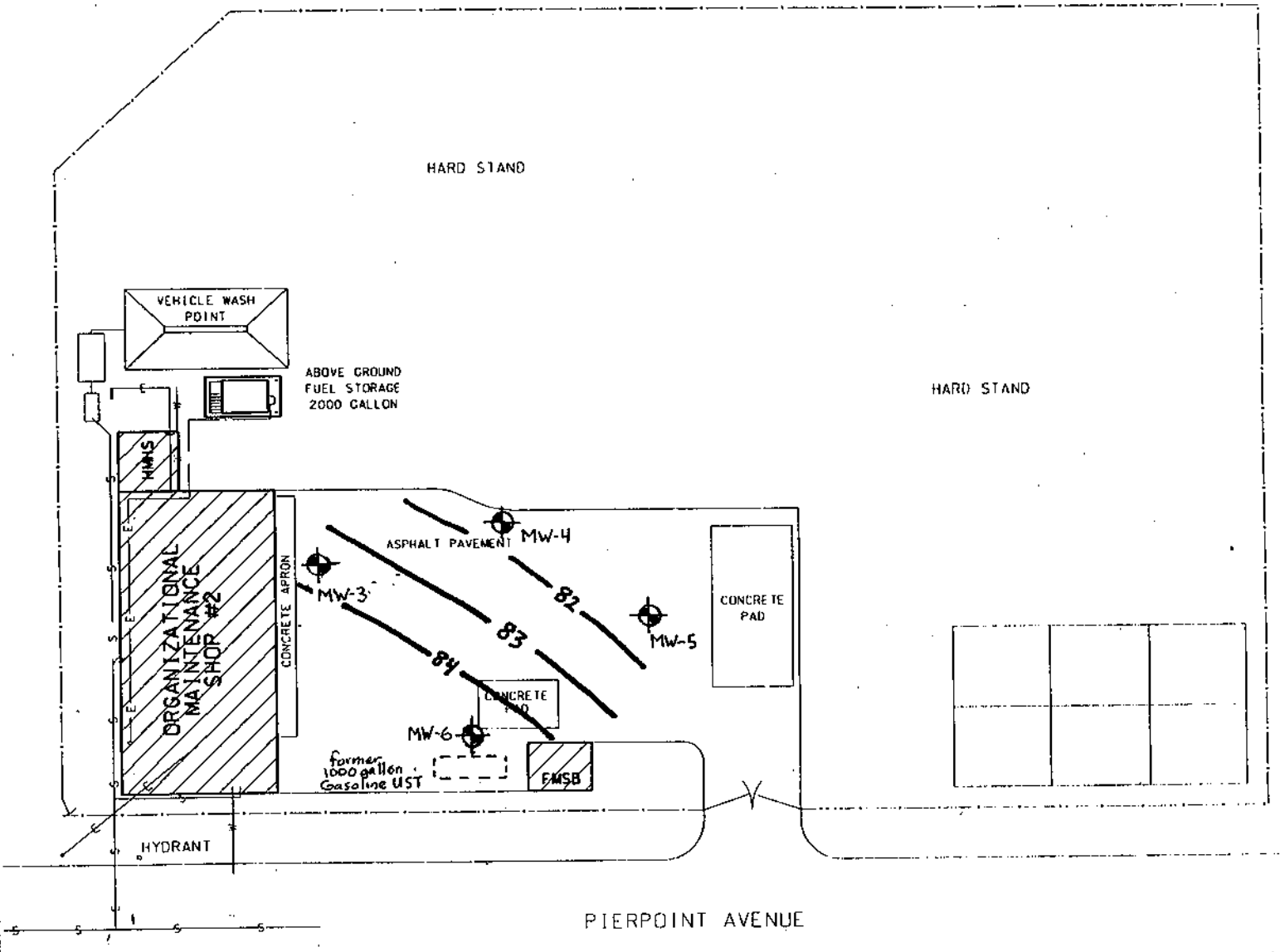


Scale: 1: 24,000
 Contour Interval: 20 ft.
 Map Source:
 U.S.G.S. Rutland Quadrangle, 1988
 U.S. Geological Survey

Prepared: July 28, 1996

WATERSHED ENVIRONMENTAL SERVICES, INC.
 P.O. Box 64947
 Burlington, Vermont 05406

GROUNDWATER CONTOUR MAP **VT NATIONAL GUARD ORGANIZATIONAL MAINTENANCE SHOP #2** **PIERPOINT AVENUE, RUTLAND, VT**



Scale: 1" = 40' Contour Interval: 1.0 ft.
 Date of Measurement: August 17, 1996
 Map Source:
 Vermont Army National Guard
 Camp Johnson, Colchester, VT

Prepared: August 30, 1996
WATERSHED ENVIRONMENTAL SERVICES
 P.O. Box 64947
 Burlington, Vermont 05406

VERMONT NATIONAL GUARD
ORGANIZATIONAL MAINTENANCE SHOP #2
RUTLAND, VT

TABLE 1
MONITORING WELL POINT AND GROUNDWATER ELEVATIONS
17 August, 1996

STATION	WELL ELEVATION (Top of Pipe)	WATER LEVEL	WATER TABLE ELEVATION
MW-3	100.76	17.16	83.6
MW-4	99.3	17.83	81.47
MW-5	99.84	18.66	81.18
MW-6	100.61	15.74	84.87

Notes:

Measurements in decimal feet

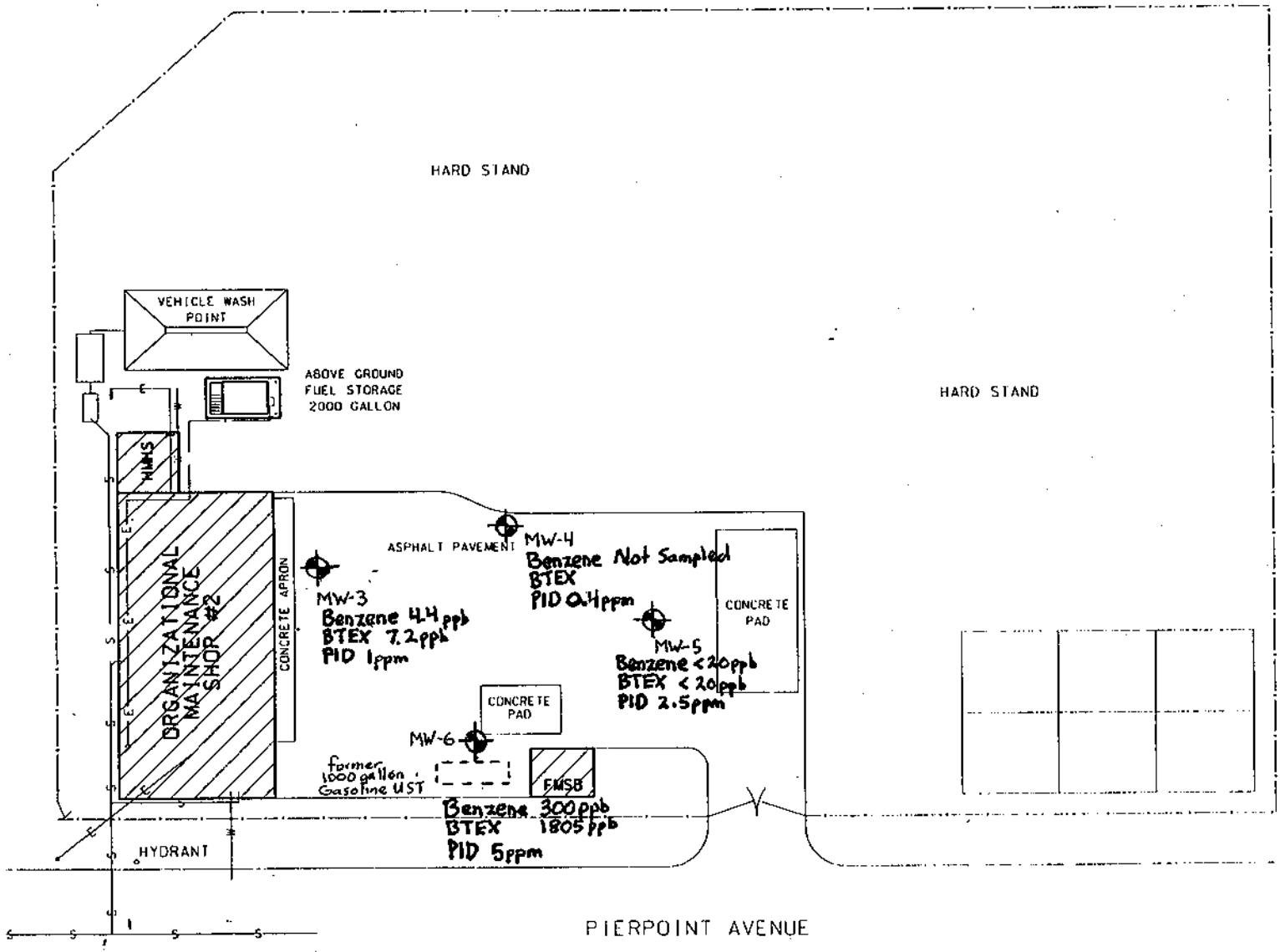
Bench mark: southeast corner of concrete pad at former diesel fuel stand at entrance to facility

Bench mark elevation: 100.00 feet

Watershed Environmental Services, Inc.

P.O. Box 64947 Burlington, Vermont 05406

CONTAMINANT DISTRIBUTION MAP **VT NATIONAL GUARD ORGANIZATIONAL MAINTENANCE SHOP #2** **PIERPOINT AVENUE, RUTLAND, VT**



Scale: 1" = 40'
 Date of Sampling: August 17, 1996
 Map Source:
 Vermont Army National Guard
 Camp Johnson, Colchester, VT

Prepared: August 30, 1996
WATERSHED ENVIRONMENTAL SERVICES
 P.O. Box 64947
 Burlington, Vermont 05406

Watershed Environmental Services, Inc.

P.O. Box 64947 Burlington, Vermont 05406

Office: 802-860-7385 FAX: 802-860-1964 *51

VERMONT NATIONAL GUARD ORGANIZATIONAL MAINTENANCE SHOP #2 Rutland, Vermont

SOIL BORING LOG - AUGUST 5, 1996

Page 1-2

MW-3

SOIL BORING/ MONITORING WELL MW-3

Location: 10 ft. south of maintenance garage; 50 ft. northeast of gasoline UST site.

Background PID reading: 0.6 ppm; PID: H-Nu Systems model PI-101 with 10.2 eV lamp

Surface: Asphalt pavement

Sample Interval	PID reading	Soil Description
0 - 5.0 ft AS	0.6 ppm	Dry, brown gravel fill
5.0 - 7.0 ft SS	1.0 ppm	Dry, brown, sand and gravel fill
7.0 - 10.0 ft AS	1.2 ppm	Dry, brown sand and gravel with abundant cobbles
10.0 - 11.9 ft SS	1.3 ppm	Moist, brown, pebbly loam with fine sand and silt lenses
12.0 - 15.0 ft AS	1.2 ppm	Moist, brown, cobbly sand and gravel
15.0 - 17.0 ft SS	1.3 ppm	Wet, brown, cobbly fine sand and silt glacial till
17.0 - 20.0 ft. AS	1.2 ppm	Saturated, brown till

Note: Soil profile is composite of two soil boring attempts to reach target depth

Well Construction:

Pipe: 2 in. sch. 40 PVC, flush-coupled, F480 thread

Screen: 10 ft. section 0.010 ft factory slot screen

Screen interval: 10.0 - 20.0 ft

Sand pack: 8.0 - 20.0 ft

Bentonite: 5.8 - 8.0 ft

Well Protector: 8 in. dia. flush-mount aluminum casing with cement

MW-4

SOIL BORING/MONITORING WELL MW-4

Location: 46 ft. east of gasoline UST site.

Background PID reading: 1.2 ppm

Surface: Gravel

Sample Interval	PID reading	Soil Description
0 - 5.0 ft AS	1.2 ppm	Dry, brown sandy gravel fill with stones and cobbles
5.0 - 10.0 ft AS	1.2 ppm	Dry, brown sandy gravel with abundant cobbles (fill)
10.0 - 12.0 ft SS	1.2 ppm	Damp, brown cobbly gravel fill
12.0 - 15.0 ft AS	1.2 ppm	Damp, brown cobbly gravel
15.0 - 17.0 ft SS	1.2 ppm	Wet, brown-rusty brown, dense, fine sand and silt glacial till with abundant cobbles
17.0 - 18.9 ft SS Refusal at 18.9 ft.	1.2 ppm	Wet, brown gravel with abundant large cobbles

Note: Soil profile is composite of two soil boring attempts to reach target depth.

Well Construction:

Pipe: 2 in. sch. 40 PVC, flush-coupled, F480 thread

Screen: 10 ft. section 0.010 ft factory slot screen

Screen interval: 8.55 - 18.55 ft

Sand pack: 7.2 - 18.55 ft

Bentonite: 2.0 - 7.2 ft

Well Protector: 8 in. dia. flush-mounted aluminum casing with cement

**VERMONT NATIONAL GUARD
ORGANIZATIONAL MAINTENANCE SHOP #2
Rutland, Vermont**

SOIL BORING LOG - AUGUST 5, 1996

Page 2-2

MW-5

SOIL BORING/MONITORING WELL MW-5

Location: 46 ft. southeast of gasoline UST site.

Background PID reading: 1.5 ppm

Surface: Asphalt pavement

Sample Interval	PID reading	Soil Description
0 - 8.0 ft AS	1.5 ppm	Dry, brown medium sand and gravel fill with abundant cobbles
8.0 - 10.0 ft AS	1.5 ppm	Dry, brown silty fine sand and gravel
10.0 - 11.0 ft SS	1.7 ppm	Wet, brown silty very fine sand and very fine sandy silt with trace clay and abundant pebbles and cobbles (glacial till)

Note: Soil profile is composite of five soil boring attempts to reach target depth

Well Construction:

Pipe: 2 in. sch. 40 PVC, flush-coupled, F480 thread

Screen: 10 ft. section 0.020 ft factory slot screen

Screen interval: 10.5 - 20.5 ft

Sand pack: 9.5 - 20.5 ft

Bentonite: 8.0 - 9.5 ft

Well Protector: 4 in. dia. steel riser casing with cement

MW-6

SOIL BORING/MONITORING WELL MW-6

Location: eastern edge of former gasoline UST excavation.

Background PID reading: 1.5 ppm

Surface: gravel

Sample Interval	PID reading	Soil Description
0 - 10.0 ft AS	15.0 ppm	Moist, brown gravel fill
10.0 - 12.0 ft SS	2.5 ppm	Wet, rusty brown pebbly silty fine sand
12.0 - 15.0 ft AS	3.0 ppm	Wet, silty fine to very fine sand with abundant stones and cobbles; stale gasoline odor
15.0 - 17.0 ft SS	8.0 ppm	Wet, brown to olive gray gravelly till with abundant cobbles.
17.0 - 21 ft AS	90.0 ppm	Wet, olive gray glacial till with abundant stones and cobbles; moderate gasoline odors.

Well Construction:

Pipe: 2 in. sch. 40 PVC, flush-coupled, F480 thread

Screen: 10 ft. section 0.010 ft factory slot screen

Screen interval: 10.1 - 20.1 ft

Sand pack: 7.2 - 20.1 ft

Bentonite: 5.8 - 7.2 ft

Well Protector: 8 in. dia. flush-mount aluminum road box casing with cement

AS = Auger Spoils sample

SS = Split-Spoon sample

ppm = parts per million

M & W Soils Engineering, Inc.
Main St. Charlestown, NH 03603

TO WATERSHED ENVIRONMENTAL SERVICES ADDRESS BURLINGTON, VT
 PROJECT NAME RUTLAND NATIONAL GUARD LOCATION RUTLAND, VT
 REPORT SENT TO MICHAEL K. SPARKS PROJ. NO. _____
 SAMPLE SENT TO RETAINED BY WATERSHED ENV. OUR JOB NO. 6763-96

SHEET 1 OF 1
 DATE 8/5/96
 HOLE NO. MW-3
 LINE & STA. _____
 OFFSET _____

GROUND WATER OBSERVATIONS		CASING SAMPLER CORE BAR		SURFACE ELEV.	
AT <u>16'7"</u>	AT <u>IMMEDIATELY</u> HOURS	Type <u>FA</u>	<u>SS</u>	DATE STARTED <u>8/5/96</u>	
		Size I. D. <u>4"</u>	<u>1 1/2"</u>	DATE COMPL. <u>8/5/96</u>	
		Hammer Wt. _____	<u>140#</u>	BORING FORMAN <u>M.H., M.C. & G.B.</u>	
		Hammer Fall _____	<u>30"</u>	INSPECTOR <u>M. SPARKS</u>	
				SOILS ENGR. _____	

LOCATION OF BORING

Depth	CASING BLOWS PER FOOT	SAMPLE DEPTHS FROM-TO	TYPE OF SAMPLE	Blows per 6" on sampler			MOISTURE DENSITY OF CONSTANT	STRATA CHANGE ELEV.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, cond., hardness. Drilling time, seams and ect.	SAMPLE		
				From 0-6	6-12	To 12-18				NO.	PEN	REC
								3'	ASPHALT			
							MED. DENSE		GRAVEL AND SANDY FILL			
5'								5'				
									GRAVEL AND LARGE COBBLES			
10'		10' - 11'9"	SS	10	7					1	21	17
				28	35/3"				SAME MATERIAL			
15'		15' - 17'	SS	16	18					2	24	18
				28	31			16'	SAME MATERIAL			
							WET	17'	GRAVEL, SOME SILTS			
									OLIVE BROWN TILL			
20'								20'				
									(NOTE: DEEPEST OF TWO ATTEMPTS)			
									SET WELL			
									TOP OF WELL AT 9'11"			
									BOTTOM OF WELL AT 19'11"			
									SAND TO 8'			
									BENTONITE TO 6'8"			
									MATERIALS USED:			
									10' OF 2" PVC 0.010" SCREEN			
									10' OF 2" PVC SOLID			
									25# OF BENTONITE			
									100# OF SAND			
									40# OF CEMENT MIX			
									1 EXPANSION PLUG			
									1 PVC CAP			
									1 ALUMINUM MANHOLE			

GROUND SURFACE TO 20'

USED 4" FA CASING THEN _____

Sample Type
 D-Dry C-Cored W-Washed
 UP-Unfinished Piston
 TP-Test Pit A-Auger V-Vane Test
 UT-Undisturbed Thinwall

Proportions Used
 trace 0 to 10%
 little 10 to 20%
 some 20 to 35%
 and 35 to 50%

140 lb. wt. x 30"-fall an 2" O.D. Sampler
 Cohesionless Density
 0-10 Loose
 10-30 Med. Dense
 30-50 Dense
 50+ Very Dense
 Cohesive Consistency
 0-4 Soft 30 + Hard
 4-8 M/Stiff
 8-15 Stiff
 15-30 V-Stiff

summary
 EARTH BORING 20'
 ROCK CORING _____
 SAMPLES 2
 HOLE NO. MW-3

M & W Soils Engineering, Inc.
Main St. Charlestown, NH 03603

TO WATERSHED ENVIRONMENTAL SERVICES ADDRESS BURLINGTON, VT
 PROJECT NAME RUTLAND NATIONAL GUARD LOCATION RUTLAND, VT
 REPORT SENT TO MICHAEL K. SPARKS PROJ. NO. _____
 SAMPLE SENT TO RETAINED BY WATERSHED ENV. OUR JOB NO. 6763-96

SHEET 1 OF 1
 DATE 8/5/96
 HOLE NO. MW-4
 LINE & STA. _____
 OFFSET _____

GROUND WATER OBSERVATIONS		CASING SAMPLER CORE BAR.		SURFACE ELEV.	
AT <u>16'8"</u>	AT <u>IMMEDIATELY</u> HOURS	Type <u>FA</u>	<u>SS</u>	DATE STARTED <u>8/5/96</u>	
		Size I. D. <u>4"</u>	<u>1 1/2"</u>	DATE COMPL. <u>8/5/96</u>	
		Hammer Wt. _____	<u>140#</u>	BORING FORMAN <u>M.H., M.C. & G.B.</u>	
AT _____	AT _____ HOURS	Hammer Fall _____	<u>30"</u>	INSPECTOR <u>M. SPARKS</u>	
				SOILS ENGR. _____	

LOCATION OF BORING

Depth	CASING BLOWS PER FOOT	SAMPLE DEPTHS FROM-TO	TYPE OF SAMPLE	Blows per 6" on sampler			MOISTURE DENSITY OF CONSTANT	STRATA CHANGE ELEV.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, cond., hardness, Drilling time, seams and ect.	SAMPLE		
				From 0-6	6-12	To 12-18				NO.	PEN	REC
5'									GRAVELS AND SANDS			
10'							DENSE		SAME MATERIAL			
									GRAVELS AND LARGE COBBLES			
									SAME MATERIAL			
15'		15' - 17'	SS	11	12							
				18	24			16'6"	SAME MATERIAL	1	24"	21"
20'							WET		OLIVE BROWN TILL			
								18'9"	REFUSAL TO AUGER			
									(NOTE: DEEPEST OF TWO ATTEMPS)			
									SET WELL			
									TOP OF WELL AT 10'1"			
									BOTTOM OF WELL AT 20'1"			
									SAND TO 7'			
									BENTONITE SEAL AT 3'			
									MATERIALS USED:			
									10' OF 2" PVC 0.010" SCREEN			
									10' OF 2" PVC SOLID			
									25# OF BENTONITE			
									75# OF SAND			
									40# OF CEMENT MIX			
									1 EXPANSION PLUG			
									1 PVC CAP			
									1 ALUMINUM MANHOLE			

GROUND SURFACE TO 18'9"

USED 4" FA CASING THEN _____

Sample Type

D-Dry C-Cored W-Washed
 UP-Unfinished Piston
 TP-Test Pit A-Auger V-Vane Test
 UT-Undisturbed Thinwall

Proportions Used
 trace 0 to 10%
 little 10 to 20%
 some 20 to 35%
 and 35 to 50%

140 lb. wt. x 30"-fall an 2" O.D. Sampler
 Cohesionless Density
 0-10 Loose
 10-30 Med. Dense
 30-50 Dense
 50+ Very Dense
 Cohesive Consistency
 0-4 Soft 30 + Hard
 4-8 M/Stiff
 8-15 Stiff
 15-30 V-Stiff

summary

EARTH BORING 18'9"
 ROCK CORING _____
 SAMPLES 1
 HOLE NO. MW-4

M & W Soils Engineering, Inc.

Main St. Charlestown, NH 03603

TO WATERSHED ENVIRONMENTAL SERVICES ADDRESS BURLINGTON, VT
 PROJECT NAME RUTLAND NATIONAL GUARD LOCATION RUTLAND, VT
 REPORT SENT TO MICHAEL K. SPARKS PROJ. NO. _____
 SAMPLE SENT TO RETAINED BY WATERSHED ENV. OUR JOB NO. 6763-96

SHEET 1 OF 1
 DATE 8/5/96
 HOLE NO. MW-5
 LINE & STA. _____
 OFFSET _____

GROUND WATER OBSERVATIONS
 AT 16'8" AT IMMEDIATELY HOURS
 AT _____ AT _____ HOURS

Type _____
 Size I. D. 4" 1 1/2"
 Hammer Wt. 140# BIT
 Hammer Fall 30"

SURFACE ELEV. _____
 DATE STARTED 8/5/96
 DATE COMPL. 8/5/96
 BORING FORMAN M.H., M.C. & G.B.
 INSPECTOR M. SPARKS
 SOILS ENGR. _____

LOCATION OF BORING

Depth	CASING BLOWS PER FOOT	SAMPLE DEPTHS FROM-TO	TYPE OF SAMPLE	Blows per 6" on sampler			MOISTURE DENSITY OF CONSTANT	STRATA CHANGE ELEV.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, cond., hardness. Drilling time, seams and ect.	SAMPLE		
				From 0-6	6-12	To 12-18				NO.	PEN	REC
								2'	ASPHALT			
								4'	BROWN GRAVEL AND FILL			
5'									COARSE GRAVEL AND LARGE COBBLES			
									SAME MATERIAL	1	12'	10'
10'		10' - 11'	SS	8	24			14'	SAME MATERIAL			
							MOIST	16'	SILTY GRAVEL			
15'							WET		OLIVE BROWN TILL			
								20'	NO LEDGE TO DEPTH			
20'									(NOTE: DEEPEST OF FIVE ATTEMPTS)			
									SET WELL			
									TOP OF WELL AT 10'			
									BOTTOM OF WELL AT 20'			
									SAND TO 8'			
									BENTONITE TO 5'6"			
									MATERIALS USED:			
									10' OF 2" PVC 0.010" SCREEN			
									10' OF 2" PVC SOLID			
									25# OF BENTONITE			
									50# OF SAND			
									40# OF CEMENT MIX			
									1 EXPANSION PLUG			
									1 PVC CAP			
									1 ALUMINUM MANHOLE			

GROUND SURFACE TO 20'

USED 4" FA CASING THEN _____

Sample Type

D-Dry C-Cored W-Washed
 UP-Unfinished Piston
 TP-Test Pit A-Auger V-Vane Test
 UT-Undisturbed Thinwall

Proportions Used
 trace 0 to 10%
 little 10 to 20%
 some 20 to 35%
 and 35 to 50%

140 lb. wt. x 30"-fall an 2" O.D. Sampler
 Cohesionless Density
 0-10 Loose
 10-30 Med. Dense
 30-50 Dense
 50+ Very Dense
 Cohesive Consistency
 0-4 Soft 30 + Hard
 4-8 M/Stiff
 8-15 Stiff
 15-30 V-Stiff

Summary

EARTH BORING 20'
 ROCK CORING _____
 SAMPLES 1
 HOLE NO. MW-5

M & W Soils Engineering, Inc.
Main St. Charlestown, NH 03603

TO WATERSHED ENVIRONMENTAL SERVICES ADDRESS BURLINGTON, VT
 PROJECT NAME RUTLAND NATIONAL GUARD LOCATION RUTLAND, VT
 REPORT SENT TO MICHAEL K. SPARKS PROJ. NO. _____
 SAMPLE SENT TO RETAINED BY WATERSHED ENV. OUR JOB NO. 6763-96

SHEET 1 OF 1
 DATE 8/5/96
 HOLE NO. MW-6
 LINE & STA. _____
 OFFSET _____

GROUND WATER OBSERVATIONS		Type		CASING	SAMPLER	CORE BAR	SURFACE ELEV.
AT <u>16'6"</u>	AT <u>IMMEDIATELY</u>	HOURS	HSA	SS			DATE STARTED <u>8/5/96</u>
			Size I. D.	<u>4 1/4"</u>	<u>1 1/2"</u>		DATE COMPL. <u>8/5/96</u>
			Hammer Wt.		<u>140#</u>	BIT	BORING FORMAN <u>M.H., M.C. & G.B.</u>
			Hammer Fall		<u>30"</u>		INSPECTOR <u>M. SPARKS</u>
							SOILS ENGR.

LOCATION OF BORING

Depth	CASING BLOWS PER FOOT	SAMPLE DEPTHS FROM-TO	TYPE OF SAMPLE	Blows per 6" on sampler			MOISTURE DENSITY OF CONSTANT	STRATA CHANGE ELEV.	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, cond., hardness, Drilling time, seams and ect.	SAMPLE		
				From	To					NO.	PEN	REC
				0-6	6-12	12-18			GRAVEL AND FILL			
								3'	SAME MATERIAL			
5'									GRAVEL AND COBBLES			
10'		10' - 12'	SS	7	14			10'	SAME MATERIAL	1	24"	20'
				8	7							
							MED. DENSE		OLIVE BROWN GRAVEL AND SILT			
15'		15' - 17'	SS	14	16			15'	SAME MATERIAL	2	24"	18'
				12	17							
							WET		OLIVE BROWN TILL			
20'								20'	NO LEDGE TO DEPTH			
									SET WELL			
									TOP OF WELL AT 10'1"			
									BOTTOM OF WELL AT 20'1"			
									SAND TO 7'6"			
									BENTONITE TO 5'6"			
									MATERIALS USED:			
									10' OF 2" PVC 0.010" SCREEN			
									10' OF 2" PVC SOLID			
									25# OF BENTONITE			
									250# OF SAND			
									40# OF CEMENT MIX			
									1 EXPANSION PLUG			
									1 PVC CAP			
									1 ALUMINUM MANHOLE			

GROUND SURFACE TO 20'

USED 4" FA CASING THEN

Sample Type
 D-Dry C-Cored W-Washed
 UP-Unfinished Piston
 TP-Test Pit A-Auger V-Vane Test
 UT-Undisturbed Thinwall

Proportions Used
 trace 0 to 10%
 little 10 to 20%
 some 20 to 35%
 and 35 to 50%

140 lb. wt. x 30"-fall an 2" O.D. Sampler
 Cohesionless Density
 0-10 Loose
 10-30 Med. Dense
 30-50 Dense
 50+ Very Dense
 Cohesive Consistency
 0-4 Soft 30 + Hard
 4-8 M/Stiff
 8-15 Stiff
 15-30 V-Stiff

summary
 EARTH BORING 20'
 ROCK CORING _____
 SAMPLES 2
 HOLE NO. MW-6

VERMONT NATIONAL GUARD
 ORGANIZATIONAL MAINTENANCE SHOP #2
 RUTLAND, VERMONT

TABLE 2
 GROUNDWATER QUALITY SAMPLING RESULTS
 AUGUST 17, 1996 SAMPLING EVENT

		STATION / CONCENTRATION				
EPA Method 8020	PARAMETER	MW-3	MW-4	MW-5	MW-6	Trip Blank
	Benzene (ug/L)	4.4	NS	<20	300	<1
	Ethylbenzene (ug/L)	<1	NS	<20	561	<1
	Toluene (ug/L)	2.8	NS	<20	164	<1
	Xylene (ug/L)	<1	NS	<20	780	<1
	MTBE (ug/L)	<10	NS	<200	<500	<10
	Total BTEX (ug/L)	7.2	NS	<20	1805	<1
Head-space Screening	PID Vapor Reading (ppm)	1	0.4	2.5	5	

Notes:

MW-4 dry, no sample collected

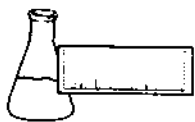
MW-5 analysis of saturated sediment in well bore

PID background reading: 0.4 ppm

vng-jeri.wq1 sheet 2

Watershed Environmental Services, Inc.

P.O. Box 64947 Burlington, Vermont 05406



ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

REPORT OF LABORATORY ANALYSIS

CLIENT: Watershed Environmental Services, Inc. PROJECT CODE: WATR1806
PROJECT NAME: VNG OMS #2 Rutland REF.#: 92,692 - 92,695
REPORT DATE: August 27, 1996
DATE SAMPLED: August 17, 1996

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. Chain of custody indicated sample preservation with HCl.

All samples were prepared and analyzed by requirements outlined in the referenced method and within the specified holding times. All instrumentation was calibrated with the appropriate frequency and verified by the requirements outlined in the referenced method. Blank contamination was not observed at levels affecting the analytical results.

Analytical method precision and accuracy was monitored by laboratory control standards which included matrix spike, duplicate and quality control analyses. These standards were determined to be within established laboratory method acceptance limits.

Individual sample performance was monitored by the addition of surrogate analytes to each sample. All surrogate recovery data was determined to be within laboratory QA/QC guidelines unless otherwise noted.

Reviewed by,

Harry B. Locker, Ph.D.
Laboratory Director

enclosures



Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Watershed Environmental Services, Inc. PROJECT CODE: WATR1806
PROJECT NAME: VNG OMS #2 Rutland REF.#: 92,692
REPORT DATE: August 27, 1996 STATION: MW-3
DATE SAMPLED: August 17, 1996 TIME SAMPLED: 12:30
DATE RECEIVED: August 19, 1996 SAMPLER: Mike Sparks
DATE ANALYZED: August 23, 1996

<u>Parameter</u>	<u>Detection Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Benzene	1	4.4
Chlorobenzene	1	ND ¹
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	2.8
Xylenes	1	ND
MTBE	10	ND

Bromobenzene Surrogate Recovery: 95%

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

NOTES:

1 None detected



ENDYNE, INC.

Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Watershed Environmental Services, Inc. PROJECT CODE: WATR1806
PROJECT NAME: VNG OMS #2 Rutland REF.#: 92,694
REPORT DATE: August 27, 1996 STATION: MW-5
DATE SAMPLED: August 17, 1996 TIME SAMPLED: 12:10
DATE RECEIVED: August 19, 1996 SAMPLER: Mike Sparks
DATE ANALYZED: August 23, 1996

<u>Parameter</u>	<u>Detection Limit (ug/kg)</u>	<u>Concentration (ug/kg)</u>
Benzene	20	ND ¹
Chlorobenzene	20	ND
1,2-Dichlorobenzene	20	ND
1,3-Dichlorobenzene	20	ND
1,4-Dichlorobenzene	20	ND
Ethylbenzene	20	ND
Toluene	20	ND
Xylenes	20	ND
MTBE	200	ND

Bromobenzene Surrogate Recovery: 104%

Percent Solids: 72%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 None detected



Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Watershed Environmental Services, Inc. PROJECT CODE: WATR1806
PROJECT NAME: VNG OMS #2 Rutland REF.#: 92,693
REPORT DATE: August 27, 1996 STATION: MW-6
DATE SAMPLED: August 17, 1996 TIME SAMPLED: 12:45
DATE RECEIVED: August 19, 1996 SAMPLER: Mike Sparks
DATE ANALYZED: August 23, 1996

<u>Parameter</u>	<u>Detection Limit (ug/L)¹</u>	<u>Concentration (ug/L)</u>
Benzene	50	300.
Chlorobenzene	50	ND ²
1,2-Dichlorobenzene	50	ND
1,3-Dichlorobenzene	50	ND
1,4-Dichlorobenzene	50	ND
Ethylbenzene	50	561.
Toluene	50	164.
Xylenes	50	780.
MTBE	500	ND

Bromobenzene Surrogate Recovery: 91%

NUMBER OF UNIDENTIFIED PEAKS FOUND: >10

NOTES:

1 Detection limit raised due to high levels of contaminants. Sample run at a 2% dilution.

2 None detected



Laboratory Services

32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333
FAX 879-7103

LABORATORY REPORT

EPA METHOD 602--PURGEABLE AROMATICS

CLIENT: Watershed Environmental Services, Inc. PROJECT CODE: WATR1806
PROJECT NAME: VNG OMS #2 Rutland REF.#: 92,695
REPORT DATE: August 27, 1996 STATION: Trip Blank
DATE SAMPLED: July 11, 1996 TIME SAMPLED: Not Indicated
DATE RECEIVED: August 19, 1996 SAMPLER: Mike Sparks
DATE ANALYZED: August 23, 1996

<u>Parameter</u>	<u>Detection Limit (ug/L)</u>	<u>Concentration (ug/L)</u>
Benzene	1	ND ¹
Chlorobenzene	1	ND
1,2-Dichlorobenzene	1	ND
1,3-Dichlorobenzene	1	ND
1,4-Dichlorobenzene	1	ND
Ethylbenzene	1	ND
Toluene	1	ND
Xylenes	1	ND
MTBE	10	ND

Bromobenzene Surrogate Recovery: 98%

NUMBER OF UNIDENTIFIED PEAKS FOUND: 0

NOTES:

1 None detected



ENDYNE, INC.



32 James Brown Drive
Williston, Vermont 05495
(802) 879-4333

19829

CHAIN-OF-CUSTODY RECORD

Project Name: VNG OMS #2 Rutland	Reporting Address: Watershed Environmental Serv. Inc.	Billing Address: Watershed
Site Location: Rutland, VT	P.O. Box 64947 Burlington, VT 05406	
Endyne Project Number: WATR1806	Company: Watershed	Sampler Name: Mike Sparks
	Contact Name/Phone #: Mike Sparks 802-1964	Phone #: 802-860-1964

[illegible]

Relinquished by: Signature 	Received by: Signature 	Date/Time 8-19-96 5:25pm
Relinquished by: Signature	Received by: Signature	Date/Time

New York State Project: Yes ☐ No ☐

Requested Analyses

[illegible]